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10/577,105	04/25/2006	Reiner Bernardus Maria Klein Gunnewiek	348162-982800	1152

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EXAMINER	
KIM, HEE-YONG	
ART UNIT	PAPER NUMBER
2482	
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/577,105	KLEIN GUNNEWIEK ET AL.	
	Examiner	Art Unit	
	HEE-YONG KIM	2482	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *07 September 2010*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-14* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-14* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. This office action is in reply to Applicant's Response dated September 7, 2010.

2. **Claims 9-12 and 14** are amended.

3. **Claim 1-14** are pending.

Response to Arguments

4. Regarding claim 1, applicant argues (pp.8) that examiner's claim interpretation of un-referenced pixels is different than claim 1, because examiner reads the un-referenced pixels as **not used** for motion vector estimation but claim 1 recites "un-referenced pixels are **used** to create a candidate motion vector". Examiner respectfully disagrees. As claim 1 recites, a first and second group of un-referenced pixels are pixels which do not comprise respective motion vectors. Therefore, examiner read a first and second group of un-referenced pixels as pixels **not used** for **motion vector estimation of the first motion vector field**. Please notice that Examiner is allowed to have broadest reasonable interpretation. Applicant further argues (pp.8) that there is no teaching or suggestion in Kobayashi or Liu of specifically using un- referenced pixels that are mutually connected to modify a first vector field to create a second vector field. Examiner respectfully disagrees. Liu discloses un- referenced pixels that are mutually connected (light pixels in Fig.13 and 14) and there is a motivation using Kobayashi's scaled motion estimation between the unreferenced pixels, in order to improve the motion vector accuracy.

5. Regarding **claims 9-10, and 14**, applicant argues that they are allowable because they have similar features to claim 1. Since examiner maintains the rejection of claim 1, the argument is groundless.

6. Regarding **claims 2-8, and 11-13**, applicant argues that they are allowable because they depends on one of allowable claims 1, 9-10, and 14. Since examiner maintains the rejection of claim 1, 9-10, and 14, the argument is groundless.

Specification

1. The disclosure is objected to because of the following informalities:

This application does not contain an abstract of the disclosure as required by 37 CFR 1.72(b). An abstract on a separate sheet is required.

Appropriate correction is required.

2. The following guidelines illustrate the preferred layout for the specification of a utility application. These guidelines are suggested for the applicant's use.

Arrangement of the Specification

As provided in 37 CFR 1.77(b), the specification of a utility application should include the following sections in order. Each of the lettered items should appear in upper case, without underlining or bold type, as a section heading. If no text follows the section heading, the phrase "Not Applicable" should follow the section heading:

(a) TITLE OF THE INVENTION.
(b) CROSS-REFERENCE TO RELATED APPLICATIONS.
(c) STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT.
(d) THE NAMES OF THE PARTIES TO A JOINT RESEARCH AGREEMENT.
(e) INCORPORATION-BY-REFERENCE OF MATERIAL SUBMITTED ON A COMPACT DISC.
(f) BACKGROUND OF THE INVENTION.

(1) Field of the Invention.
(2) Description of Related Art including information disclosed under 37 CFR 1.97 and 1.98.
(g) BRIEF SUMMARY OF THE INVENTION.
(h) BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWING(S).
(i) DETAILED DESCRIPTION OF THE INVENTION.
(j) CLAIM OR CLAIMS (commencing on a separate sheet).
(k) ABSTRACT OF THE DISCLOSURE (commencing on a separate sheet).
(l) SEQUENCE LISTING (See MPEP § 2424 and 37 CFR 1.821-1.825. A "Sequence Listing" is required on paper if the application discloses a nucleotide or amino acid sequence as defined in 37 CFR 1.821(a) and if the required "Sequence Listing" is not submitted as an electronic document on compact disc).

Claim Rejections - 35 USC § 112

3. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

1. **Claim 14** is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Claim 14 recites "computer usable medium" which is not disclosed in specification and original claim. Therefore it is a new matter.

2. Claims 1-?? Are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

3. Regarding claim 1, it recites "...converting a first motion vector filed into a second motion vector field by determining a first one of the motion vectors of the second motion vector field...". However, there is no explicit disclosure how it is converted and what the second motion vector field means. The only thing it discloses is "comparing the match error with a predetermined match threshold and assigning the candidate motion vector to the first one of the motion vectors of the second motion vector field if the match error is below the predetermined match threshold". Secondly, the first motion vector field consist of motion vectors each of which consist of a pair of forward motion vector between (the first image and a current frame at the temporal position) and backward motion vector (the second image and a current frame at the temporal position)

Claim Rejections - 35 USC § 101

4. 35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

5. **Claim 14** is rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.

A). The Examiner notes that "comprising instructions..." does not specify how the instructions are (a) associated with the medium, or (b) the nature of instructions. Data structures not claimed as embodied (or encoded with or embedded with) in a computer readable medium are descriptive material per se, and are not statutory, Warmerdam, 33 F.3d at 1361, 31, USPQ2d at 1760). Specifying the association in the manner listed above would sufficiently address the first condition. Similarly, computer programs claimed as computer listings, instructions, or codes are just the descriptions, expressions, of the program are not "physical things". They have neither computer components nor statutory processes, as they are not "acts" being performed. In contrast, a claimed "... computer readable medium encoded with a computer program..." is a computer element which defines structural and function interrelationships between the computer program and the rest of the computer, and is statutory, ~ 32 F.3d at 1583-84, 32 USPQ2d at 1035. Specifying the instructions as a "computer program" would sufficiently address the second condition,Interim Guidelines, Annex IV (Section a).

B). Lastly, the computer program as claimed doesn't isn't properly associated with the operation. It is quite possible that the computer program may be an unrelated sub-routine or a simple commence instruction which then causes the computer to execute the operation that could be self-resident, and not encoded on the medium. The Examiner suggests that the computer program be more directly associated with the operation, Interim Guidelines, Annex IV (Section b). Corrections to the claims, and supporting specification are required.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. **Claims 1-14** are rejected under 35 U.S.C. 103(a) as being unpatentable over Kobayashi (US 5,619,268) in view of Liu (US 5,398,068), hereafter referenced as Kobayashi and Liu respectively.

Regarding **claim 1**, Kobayashi discloses A method of motion estimation, the first motion vector field (forward and backward motion vectors) being computed, on basis of a first image (reference Picture B, Fig.49) and a second image (reference Picture C, Fig.49) of a sequence of images, for a temporal position (past and future frames of the current frame, Fig.49) between the first image and the second image. However, Kobayashi fails to disclose the method comprising:

- establishing a first group of un-referenced pixels in the first image, by selecting a first set of mutually connected pixels of the first image for which the first motion vector field does not comprise respective motion vectors;
- establishing a second group of un-referenced pixels in the second image, by selecting a second set of mutually connected pixels of the second image for which the first motion vector field does not comprise respective motion vectors;
- computing a match error of a candidate motion vector, which is oriented from

the first group of un-referenced pixels to the second group of un-referenced pixels; and

- comparing the match error with a predetermined match threshold and

assigning the candidate motion vector to the first one of the motion vectors of the second motion vector field if the match error is below the predetermined match threshold.

In the same field of view, Liu discloses Method and Apparatus for Determining Motion Vectors. Specifically Liu discloses Motion Estimation Using Sparse Pixel Patterns (Fig.10) which uses selected pixels such as Fig.14 (non-selected pixels are *un-referenced pixels* because they are not used for motion vector estimation), for the purpose of reducing the complexity for motion estimation (col.4, line 52-54).

Therefore, it would have been obvious to one of ordinary skill in the art at the time invention was made to modify Kobayashi by providing motion estimation using sparse pixels patterns, for the purpose of reducing the complexity for motion estimation. The Kobayashi Motion estimation method, incorporating the Liu motion estimation using sparse pixels patterns, teaches the method comprising:

- establishing a first group of un-referenced pixels (Liu: light pixels in Fig.14) in the first image (Kobayashi: reference picture B, Fig.49), by selecting a first set of mutually connected pixels (Liu: light pixels in Fig.14) of the first image for which the first motion vector field does not comprise respective motion vectors (Liu: Light pixels at Fig.14 are Not Used for Motion Estimation);
  - establishing a second group of un-referenced pixels (Liu: light pixels in Fig.14) in the second image (Kobayashi: reference picture B, Fig.49), by selecting a

second set of mutually connected pixels (Liu: light pixels in Fig.14) of the second image for which the first motion vector field does not comprise respective motion vectors (Liu: Light pixels in Fig.14 are Not Used for Motion Estimation).

However, The Kobayashi Motion estimation method, incorporating the Liu motion estimation using sparse pixels patterns, still fails to disclose computing a match error of a candidate motion vector, which is oriented from the first group of un-referenced pixels to the second group of un-referenced pixels; and comparing the match error with a predetermined match threshold and assigning the candidate motion vector to the first one of the motion vectors of the second motion vector field if the match error is below the predetermined match threshold.

However, Kobayashi discloses computing a match error of a candidate motion vector, which is oriented from the first group of un-referenced pixels to the second group of un-referenced pixels (Fig. 51, forward and backward motion vector interpolation by scaling motion vector between two references based on temporal distance between current and a reference frame). Therefore, it would have been obvious to change the first one of the motion vector if the block match error with this motion estimation is below the predetermined match threshold, for the purpose of improvement of the motion vector accuracy.

Therefore, it would have been obvious to modify Kobayashi and Liu to provide computing a match error of a candidate motion vector, which is oriented from the first group of un-referenced pixels to the second group of un-referenced pixels; and comparing the match error with a predetermined match threshold and

assigning the candidate motion vector to the first one of the motion vectors of the second motion vector field if the match error is below the predetermined match threshold, for the purpose of improvement of the motion vector accuracy. The Kobayashi Motion estimation method, incorporating the Liu motion estimation using sparse pixels patterns, further incorporating computing a match error of a candidate motion vector, which is oriented from the first group of un-referenced pixels to the second group of un-referenced pixels and comparing the match error with a predetermined match threshold and assigning the candidate motion vector to the first one of the motion vectors of the second motion vector field if the match error is below the predetermined match threshold, has all the features of claim 1.

Regarding **claim 2**, the Kobayashi Motion estimation method, incorporating the Liu motion estimation using sparse pixels patterns, further incorporating computing a match error of a candidate motion vector, which is oriented from the first group of un-referenced pixels to the second group of un-referenced pixels and comparing the match error with a predetermined match threshold and assigning the candidate motion vector to the first one of the motion vectors of the second motion vector field if the match error is below the predetermined match threshold, as applied to claim 1, discloses whereby establishing the second group of un-referenced pixels is based on the first group of un-referenced pixels (the same sparse pixel pattern as Fig 14).

Regarding **claim 3**, the Kobayashi Motion estimation method, incorporating the Liu motion estimation using sparse pixels patterns, further incorporating computing a match error of a candidate motion vector, which is oriented from the first group of un-

referenced pixels to the second group of un-referenced pixels and comparing the match error with a predetermined match threshold and assigning the candidate motion vector to the first one of the motion vectors of the second motion vector field if the match error is below the predetermined match threshold, as applied to claim 2, discloses whereby establishing the second group of un-referenced pixels is based a spatial environment (location) of the first group of un- referenced pixels and on a particular motion vector (because the first motion vector gives the approximate of the optimum motion vector, so motion search can be sought at its neighborhood) which belongs to the first motion vector field and which is located in the spatial environment of the first group of un-referenced pixels.

Regarding **claim 4**, the Kobayashi Motion estimation method, incorporating the Liu motion estimation using sparse pixels patterns, further incorporating computing a match error of a candidate motion vector, which is oriented from the first group of un-referenced pixels to the second group of un-referenced pixels and comparing the match error with a predetermined match threshold and assigning the candidate motion vector to the first one of the motion vectors of the second motion vector field if the match error is below the predetermined match threshold, as applied to claim 2, discloses whereby establishing the second group of un-referenced pixels is based a spatial environment (location) of the first group of un- referenced pixels and null vector (because it was well known in the art that the zero motion vector is optimum motion vector in most time).

Regarding **claim 5**, the Kobayashi Motion estimation method, incorporating the Liu motion estimation using sparse pixels patterns, further incorporating computing a

match error of a candidate motion vector, which is oriented from the first group of un-referenced pixels to the second group of un-referenced pixels and comparing the match error with a predetermined match threshold and assigning the candidate motion vector to the first one of the motion vectors of the second motion vector field if the match error is below the predetermined match threshold, as applied to claim 1, discloses whereby establishing the second group of un-referenced pixels is based on computing overlap between the first group of un-referenced pixels and a candidate group of un-referenced pixels in the second image (Liu: determine shift vector minimizing SAD (sum of absolute difference), col.7, line 44-49).

Regarding **claim 6**, the Kobayashi Motion estimation method, incorporating the Liu motion estimation using sparse pixels patterns, further incorporating computing a match error of a candidate motion vector, which is oriented from the first group of un-referenced pixels to the second group of un-referenced pixels and comparing the match error with a predetermined match threshold and assigning the candidate motion vector to the first one of the motion vectors of the second motion vector field if the match error is below the predetermined match threshold, as applied to claim 1, discloses whereby a first number of pixels of the first group of un-referenced pixels is above a first predetermined count threshold, because the number of first group of un-referenced pixels is fixed number in Liu and therefore it can be above a first predetermined count threshold

Regarding **claim 7**, the Kobayashi Motion estimation method, incorporating the Liu motion estimation using sparse pixels patterns, further incorporating computing a

match error of a candidate motion vector, which is oriented from the first group of un-referenced pixels to the second group of un-referenced pixels and comparing the match error with a predetermined match threshold and assigning the candidate motion vector to the first one of the motion vectors of the second motion vector field if the match error is below the predetermined match threshold, as applied to claim 1, discloses whereby a first number of pixels of the first group of un-referenced pixels is below a second predetermined count threshold, because the number of first group of un-referenced pixels is fixed number in Liu and therefore it can be below a second predetermined count threshold.

Regarding **claim 8**, the Kobayashi Motion estimation method, incorporating the Liu motion estimation using sparse pixels patterns, further incorporating computing a match error of a candidate motion vector, which is oriented from the first group of un-referenced pixels to the second group of un-referenced pixels and comparing the match error with a predetermined match threshold and assigning the candidate motion vector to the first one of the motion vectors of the second motion vector field if the match error is below the predetermined match threshold, as applied to claim 1, discloses whereby establishing the match error comprises computing differences between respective pixel values of the first and second group of un-referenced pixels ((Liu: determine shift vector minimizing SAD (sum of absolute difference), col.7, line 44-49)).

Regarding **claim 9**, the claimed invention is an apparatus claim corresponding to the method claim 1. Therefore, it is rejected for the same way as claim 1.

Regarding **claim 10**, the Kobayashi Motion estimation apparatus, incorporating the Liu motion estimation using sparse pixels patterns, further incorporating computing a match error of a candidate motion vector, which is oriented from the first group of un-referenced pixels to the second group of un-referenced pixels and comparing the match error with a predetermined match threshold and assigning the candidate motion vector to the first one of the motion vectors of the second motion vector field if the match error is below the predetermined match threshold, as applied to claim 9, discloses An image processing apparatus (Liu: Fig.3) comprising: receiving means for receiving a signal (Liu: I^n (n-th Frame), Fig.3) corresponding to a sequence of input images; and an image processing unit for calculating a sequence of output images (Liu: I^n, Fig.3) on basis of the sequence of input images (Liu: Subtracter 25, Fig.3 which subtract input by Motion Compensation) and on basis of the second motion vector field (Liu: Motion Compensation, Fig.3) being provided by the conversion unit for converting (further incorporating computing a match error of a candidate motion vector, which is oriented from the first group of un-referenced pixels to the second group of un-referenced pixels and comparing the match error with a predetermined match threshold and assigning the candidate motion vector to the first one of the motion vectors of the second motion vector field if the match error is below the predetermined match threshold).

Regarding **claim 11**, the Kobayashi Motion estimation apparatus, incorporating the Liu motion estimation using sparse pixels patterns, further incorporating computing a match error of a candidate motion vector, which is oriented from the first group of un-referenced pixels to the second group of un-referenced pixels and comparing the match

error with a predetermined match threshold and assigning the candidate motion vector to the first one of the motion vectors of the second motion vector field if the match error is below the predetermined match threshold, as applied to claim 10, discloses *characterized in further comprising a display device* (HDTV, col.1, line 21) *for displaying the output images*.

Regarding **claim 12**, the Kobayashi Motion estimation apparatus, incorporating the Liu motion estimation using sparse pixels patterns, further incorporating computing a match error of a candidate motion vector, which is oriented from the first group of un-referenced pixels to the second group of un-referenced pixels and comparing the match error with a predetermined match threshold and assigning the candidate motion vector to the first one of the motion vectors of the second motion vector field if the match error is below the predetermined match threshold, as applied to claim 11, discloses *characterized in that it is a TV* (HDTV, col.1, line 21).

Regarding **claim 13**, claim 10 has all the features of the claimed invention, because the image processing apparatus in claim 10 is video encoding unit with the conversion unit as claimed in claim 9. Therefore, it is rejected for the same reason as claim 10.

Regarding **claim 14**, the claimed invention is a computer readable medium claim corresponding to the method claim 1. Therefore, it is rejected for the same way as claim 1.

Conclusion

8. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to HEE-YONG KIM whose telephone number is (571)270-3669. The examiner can normally be reached on Monday-Thursday, 8:00am-5pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Marsha Banks-Harold can be reached on 571-272-7905. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/HEE-YONG KIM/
Examiner, Art Unit 2621

/Andy S. Rao/
Primary Examiner, Art Unit 2482
November 18, 2010